About Cisco ACI Multi-Site

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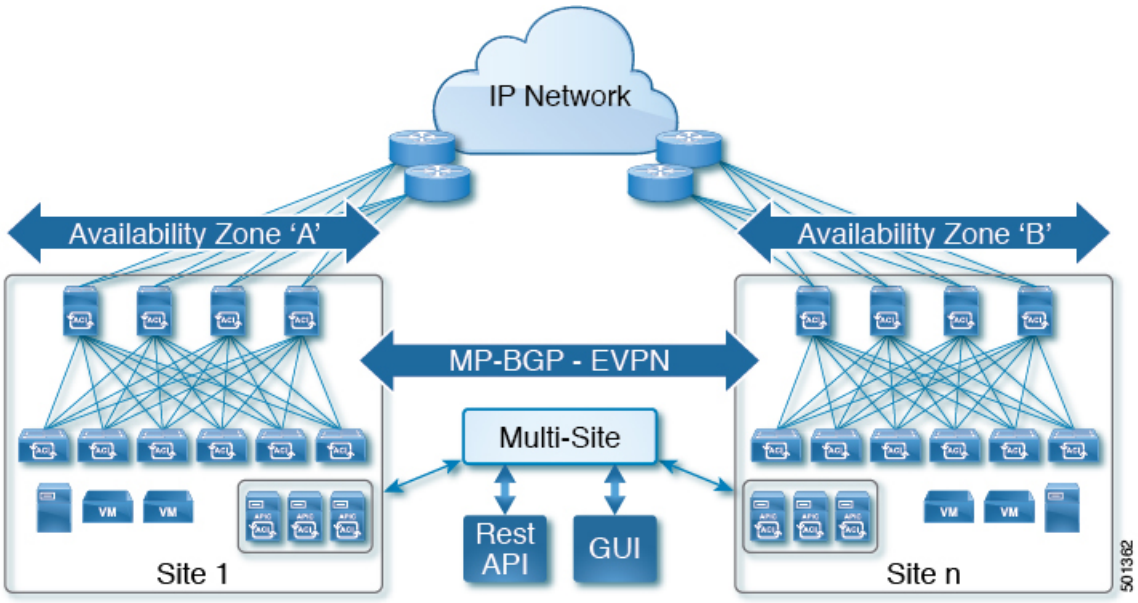
About Cisco ACI Multi-Site

Figure 1: Cisco ACI Multi-Site Architecture



As the newest advance on the Cisco ACI methods to interconnect networks, Cisco ACI Multi-Site is an architectural approach for interconnecting and managing multiple sites, each serving as a single fabric and availability zone. As shown in the diagram, the Multi-Site architecture has three main functional components:

- Two or more ACI fabrics built with Nexus 9000 switches deployed as leaf and spine nodes.
- One APIC cluster domain in each fabric.

- An inter-site policy manager, named Cisco ACI Multi-Site, which is used to manage the different fabrics and to define inter-site policies.

Multi-Site has the following benefits:

- Complementary with Cisco APIC, in Multi-Site each site is an availability zone (APIC cluster domain), which can be configured to be a shared or isolated change-control zone.
- MP-BGP EVPN is used as the control plane between sites, with data-plane VXLAN encapsulation across sites.
- The Multi-Site solution enables extending the policy domain end-to-end across fabrics. You can create policies in the Multi-Site GUI and push them to all sites or selected sites. Alternatively, you can import tenants and their policies from a single site and deploy them on other sites.
- Multi-Site enables a global view of site health.
- From the GUI of the Multi-Site Policy Manager, you can launch site APICs.
- Cross-site namespace normalization is performed by the connecting spine switches. This function requires Cisco Nexus 9000 Series switches with "EX" on the end of the name, or newer.
- Disaster recovery scenarios offering IP mobility across sites is one of the typical Multi-Site use cases.

For information about hardware requirements and compatibility, see *Cisco ACI Multi-Site Hardware Requirements Guide*.

For best practices for Multi-Site, see the *Deployment Best Practices* in **Cisco ACI Multi-Site Architecture White Paper**.

For the Cisco ACI Multi-Site documentation set, see http://www.cisco.com/c/en/us/support/cloud-systems-management/application-policy-infrastructure-controller-apic/tsd-products-support-series-home.html.

Terminology

As a complementary product with Cisco ACI, much of the Cisco ACI Multi-Site terminology is shared with ACI and APIC (for example, they both use the terms *fabric*, *tenant*, *contract*, *application profile*, *EPG*, *bridge domain*, and *L3Out*). For definitions of ACI terminology, see *Cisco Application Centric Infrastructure Fundamentals*.

Micro-services architecture
: In its first implementation, the Cisco ACI Multi-Site (inter-site policy manager) is represented by a cluster of three Virtual Machines (VMs) running on ESXi hosts. These ESXi hosts do not need to be connected to the ACI leaf nodes, because it is only required to establish IP connectivity between the VMs and the OOB IP addresses of the different APIC cluster nodes.

Namespace
: Each fabric maintains separate data in its name space, including such objects as the TEP pools, Class-IDs (EPG identifiers) and VNIDs (identifying the different Bridge Domains and the defined VRFs). The site-connecting spine switches (EX or later) perform the necessary namespace translation (normalization) between sites.

Schema
: Profile including the site-configuration objects that will be pushed to sites.

Site
APIC cluster domain or single fabric, treated as an ACI region and availability zone. It can be located in the same metro-area as other sites, or spaced world-wide.

Stretched
Objects (tenants, VRFs, EPGs, bridge-domains, subnets or contracts) are stretched when they are deployed to multiple sites.

Template
Child of a schema, a template contains configuration-objects that are shared between sites or site-specific.

Template Conformity
When templates are stretched across sites, their configuration details are shared and standardized across sites. To maintain template conformity, it is recommended to only make changes in the templates, using the Multi-Site GUI and not in a local site's APIC GUI.

Users, Roles, and Permissions

The Cisco ACI Multi-Site Orchestrator allows access according to a user's role defined by role-based access control (RBAC). Roles are used in both local and external authentication. The following user roles are available in Cisco ACI Multi-Site Orchestrator.

- Power User—A role that allows the user to perform all the operations.
- Site Manager—A role that allows the user to manage sites, tenants, and associations between them.
- Schema Manager—A role that allows the user to manage all schemas regardless of their tenant associations.
- Schema Editor—A role that allows the user to manage schemas that contain at least one tenant to which the user is explicitly associated.
- User Manager—A role that allows the user to manage all the users, their roles, and passwords.

Each role above is associated with a set of permissions, which in turn are used to show relevant and hide irrelevant elements from the user's view of the Orchestrator GUI. For example, the User Manager role has only the user-related permissions associated with it and as such the user with that role will only see **Users** and **Admin** tabs in the GUI.

User Roles and Permissions

The following table lists the Cisco ACI Multi-Site permissions allowed with each available user role. The `Attribute-Value (AV)` column specifies the user configuration string required when configuring an external authentication server for use with the Multi-Site Orchestrator. External authentication is covered in more detail in the *Administrative Operations* chapter.

Table 1: User Roles

User Role	Permissions	Attribute-Value (AV) Pair
Power User	• Dashboard • Sites • Schemas • Tenants • Users • Troubleshooting Reports	`shell:msc-roles=powerUser`
Site Manager	• Dashboard—Sites • Sites • Tenants	`shell:msc-roles=siteManager`
Schema Manager	• Dashboard—Sites and Schema Health • Schemas	`shell:msc-roles=schemaManager`
Schema Editor	• Dashboard—Sites and Schema Health • Schemas	`shell:msc-roles=schemaEditor`
User Manager	• Users	`shell:msc-roles=userManager`

Admin User

In the initial configuration script, a default `admin` user account is configured and is the only user account available when the system starts. The initial password for the *admin* user is set by the system and you are prompted to change it after the first log in.

- The `admin` user's default password is `We1come2msc!`
- The `admin` user is assigned the Power User role.
- Use the `admin` user to creating other users and perform all other Day-0 configurations.
- The account status of the *admin* user cannot be set to **Inactive**.

Read-Only Access

Each of the user roles above can be assigned in read-only mode. When read-only permissions are granted, the user can view any fabric objects available to that role just like before, but they cannot make any changes to those objects.

Cisco ACI Multi-Site Schema and Templates

Cisco ACI Object Model

At the top level, the Cisco ACI object model is built on a group of one or more tenants, allowing the network infrastructure administration and data flows to be segregated.

Policy Types

See the following section on the terminology and conceptual information on different policy types:

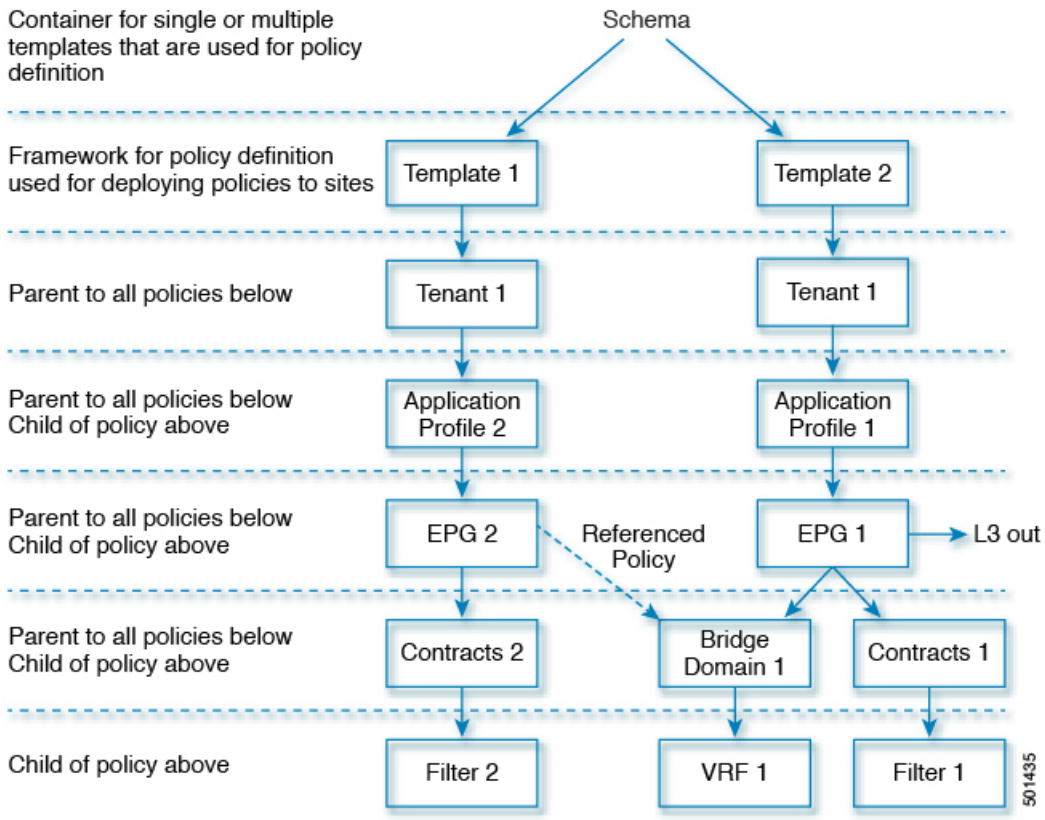
- Schemas: Schemas are the containers for single or multiple templates that are used for defining the policies. Templates are the framework for defining and deploying the policies to the sites.
- Tenants: A tenant is a logical container for application policies that enable an administrator to exercise domain-based access control. A tenant represents a unit of isolation from a policy perspective, but it does not represent a private network. Tenants can represent a customer in a service provider setting, an organization or domain in an enterprise setting, or just a convenient grouping of policies.

  Tenant is the parent policy to all the policies, for example, Application Profiles, EPG, Contract, Bridge Domains, VRFs, and Filters.
- Application Profile: The application profile is a set of requirements that an application instance has on the virtualizable fabric. The policy regulates connectivity and visibility among endpoints within the scope of the policy.
- EPG: An EPG is a managed object that is a named logical entity that contains a collection of endpoints. Endpoints are devices that are connected to the network directly or indirectly. They have an address (identity), a location, attributes (such as version or patch level), and can be physical or virtual. Knowing the address of an endpoint also enables access to all its other identity details. EPGs are fully decoupled from the physical and logical topology. Endpoint examples include servers, virtual machines, network-attached storage, or clients on the Internet. Endpoint membership in an EPG can be dynamic or static.
- Contracts: Contracts define inbound and outbound permit, deny, and QoS rules and policies such as redirect. Contracts allow both simple and complex definition of the way that an EPG communicates with other EPGs, depending on the requirements of the environment. Although contracts are enforced between EPGs, they are connected to EPGs using provider-consumer relationships. Essentially, one EPG provides a contract, and other EPGs consume that contract.
- Bridge Domains: A bridge domain (fvBD) represents a Layer 2 forwarding construct within the fabric. The following figure shows the location of bridge domains in the management information tree (MIT) and their relation to other objects in the tenant.
- Virtual Routing and Forwarding (VRF): A Virtual Routing and Forwarding (VRF) object (fvCtx) or context is a tenant network (called a private network in the APIC GUI). A tenant can have multiple VRFs. A VRF is a unique Layer 3 forwarding and application policy domain. The following figure shows the location of VRFs in the management information tree (MIT) and their relation to other objects in the tenant.
- Filters: Filters are specific rules for the policy between two EPGs. Filters consist of inbound and outbound rules: permit, deny, redirect, log, copy, and mark.

Model of Schemas and Templates

See the following illustration for simplifying the object model of Schemas and Templates:

Figure 2: Framework for Cisco ACI Multi-Site Schema and Templates



See the relation between different policy types:

- Application Profiles is the parent policy for EPGs.
- EPG is the parent policy for Contracts and Bridge Domains.
- Contracts is the parent policy for Filters.
- Bridge Domains is the parent policy for VRFs.